



**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of

Docket No. Q67992

Olfa CHETAY, et al.

Appln. No. 10/038,585

Group Art Unit: 2863

Confirmation No. 1441

Examiner: LAU, T.

Filed: January 8, 2002

For: A METHOD OF NON-INTRUSIVELY MONITORING THE MIXTURE RATIO OF A  
GAS MIXTURE HAVING AT LEAST TWO COMPONENTS

**SUBMISSION OF APPELLANTS' BRIEF ON APPEAL**

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an original and two copies of Appellants' Brief on Appeal. A check for the statutory fee of \$330.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

*Billy Carter Raulerson*

SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

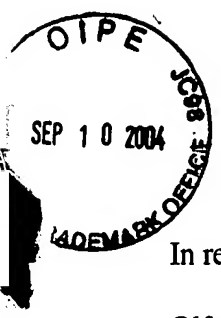
Billy Carter Raulerson  
Registration No. 52,156

WASHINGTON OFFICE

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CUSTOMER NUMBER

Date: September 10, 2004



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**APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192**

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 1.192, Appellants submit that the following comprises the Appellants' Brief on Appeal from the Office Action dated November 18, 2003, wherein claims 1-3, 7-9 and 12-13 were finally rejected.<sup>1</sup> This Appeal Brief is being filed in triplicate and is accompanied by a Submission which includes the required appeal fee set forth in 37 C.F.R. § 1.17(c). Appellants' Notice of Appeal was filed on April 14, 2004. Therefore, the present Appeal Brief is timely filed.

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<sup>1</sup> Claims 4-6 and 10-11 were objected to but have since been placed in condition for allowance (*see* Advisory Action dated May 4, 2004).

### **I. REAL PARTY IN INTEREST**

The real party in interest is ALSTOM (Assignee) by virtue of an assignment executed by the inventors (Appellants), on February 9, 2002; February 26, 2002; and March 5, 2002, and recorded by the Assignment Branch of the U.S. Patent and Trademark Office on March 28, 2002 (at Reel 012739, Frame 0170).

### **II. RELATED APPEALS AND INTERFERENCES**

Appellants state that, upon information and belief, Appellants are not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### **III. STATUS OF CLAIMS**

The present application was filed on January 8, 2002 with claims 1-10. Claim 1 was amended and claims 11-13 were added as new claims in the Amendment Under 37 C.F.R. § 1.111 filed on October 28, 2003 in response to the non-final Office Action dated May 5, 2003. Then, claims 4-6 and 10-11 were rewritten in independent form in the Amendment Under 37 C.F.R. § 1.116 filed on April 14, 2004 in response to the final Office Action dated November 18, 2003 and the Advisory Action dated March 23, 2004. Thereafter, no further amendments have been made to claims 1-13, which are all the claims currently pending in the application. In view of these amendments, claims 1-3, 7-9 and 12-13 (*see* Appendix) are the claims on appeal.

### **IV. STATUS OF AMENDMENT**

As noted in Section III, an after-final Amendment was filed on April 14, 2004 in order to rewrite claims 4-6 and 10-11 in independent form, thereby placing these claims in condition for

allowance. For purposes of this appeal, the Amendment will be entered (*see* Advisory Action dated May 4, 2004).

## V. SUMMARY OF THE INVENTION

Illustrative embodiments of the present invention relate to a system and a method of non-intrusively monitoring the insulation gas in a gas-insulated high-voltage electrical switchgear, as well as a switchgear enclosure in which the method is implemented (Appellants' specification: page 1, lines 3-9; *see also* claims 1-3, 7-9 and 12-13). Thus, embodiments of the present invention make it possible to monitor the proportions of various components of the gas in the enclosure, in an uninterrupted and non-intrusive way, without modifying the volume or the mass of the gas contained in the enclosure, and without disturbing the normal operation of the electrical switchgear.

Conventionally, the insulation gas used in a switchgear is sulfur hexafluoride (SF<sub>6</sub>). In order to combat global warming, however, the current trend is to mix the SF<sub>6</sub> with some other gas, such as Nitrogen (N<sub>2</sub>) or carbon fluoride (CF<sub>4</sub>) (Appellants' specification: page 1, lines 11-19). Such a two-component mixture also improves the breaking performance of the electrical switchgear at very low temperatures (*e.g.*, -50°C) (*Id.*). A mixture having more than two components is also possible (*Id.*).

The ratio of the SF<sub>6</sub>/N<sub>2</sub> or SF<sub>6</sub>/CF<sub>4</sub> mixture lies approximately within the range of 50/50 to 80/20 (Appellants' specification: page 1, lines 20-28). To maintain a satisfactory breaking capacity for electrical switchgear that is insulated with a gas mixture of SF<sub>6</sub>/N<sub>2</sub> or SF<sub>6</sub>/CF<sub>4</sub>, it is essential for the proportion of N<sub>2</sub> or CF<sub>4</sub> in the gas mixture to remain constant, even in the event

of leakage (*Id.*). Furthermore, there is a need for manufacturers of gas-insulated switchgear to accurately specify the ratio of the mixture components, after filling the switchgear with the gas mixture, for example, to satisfy switchgear rating conditions (Appellants' specification: page 1, lines 29-32).

Conventionally, to determine the mixture ratio or else the proportion of one component in a two-component gas mixture, chromatography or acoustic techniques are used (Appellants' specification: page 1, line 33 to page 2, line 5). These methods, however, remain limited to use in a laboratory and are not applicable to on-site monitoring of the insulation gas in electrical switchgear (*Id.*). Additionally, these methods are "intrusive" because they require that the gas mixture be tapped, which is not compatible with the normal operating conditions of the gas-insulated switchgear enclosure (*Id.*).

Accordingly, illustrative embodiments of Appellants' invention overcome these exemplary shortcomings of the conventional methods.

For example, an illustrative embodiment of the present invention is directed to a simple, inexpensive and non-intrusive method of accurately monitoring a proportion of a component in a gaseous mixture (*e.g.*, SF<sub>6</sub>/N<sub>2</sub> or SF<sub>6</sub>/CF<sub>4</sub>) having at least two components and contained in an electrical switchgear enclosure (Appellants' specification: page 2, lines 7-15; *see also* Appellants' claim 1). The method makes use of equations from thermodynamics to determine the proportion of a component in the gas mixture (Appellants' specification: page 2, lines 7-15). By using conventional sensors to measure the temperature, pressure and density of the gas mixture, the mixture ratio of the components of the gas mixture can be determined relatively

accurately from the resulting measurements by calculation or by table look-up (Appellants' specification: page 2, lines 22-27).

Appellants' Fig. 1 shows a system for monitoring an insulation gas mixture having two components (*i.e.*,  $N_2/SF_6$ ), in a gas-insulated high-voltage circuit breaker, wherein a proportion of  $N_2$  in the gas mixture is continuously monitored (Appellants' specification: page 3, lines 18-22). In the figure, a gastight enclosure 1 (*e.g.*, formed by the metal cladding of the high-voltage circuit breaker) is filled with an  $N_2/SF_6$  gas mixture under a pressure of a few bars (Appellants' specification: page 3, lines 24-29). A pressure sensor 2 and a density sensor 3 are mounted on the outside wall of the enclosure 1 (*Id.*).

The pressure sensor 2 continuously delivers a signal P representative of the absolute pressure of the gas mixture in the enclosure 1 (Appellants' specification: page 3, lines 30-35).

The density/temperature sensor 3 continuously delivers a signal p representative of the density of the gas mixture and also a signal T representative of the temperature of the gas mixture (*Id.*).

These three signals are sent to a processing unit 4 that delivers as output the proportion of  $N_2$  in the gas mixture, or in an analogous manner, the ratio of the gas mixture (Appellants' specification: page 4, lines 1-24).

These illustrative embodiments of the present invention are able to accurately and non-intrusively (*i.e.*, without tapping any gas) monitor a proportion of a component in a gas mixture having at least two components and contained in an electrical switchgear enclosure (Appellants' specification: page 5, line 29 to page 6, line 2).

## **VI. ISSUES**

The issue on appeal is whether or not claims 1-3, 7-9 and 12-13 are anticipated by U.S. Patent No. 5,841,020 to Guelich (hereinafter "Guelich"), under 35 U.S.C. § 102(b).

For at least the reasons set forth in Section VIII below, Appellants respectfully submit that claims 1-3, 7-9 and 12-13 are not anticipated by Guelich, under § 102(b).

## **VII. GROUPING OF CLAIMS**

Appealed claims 1-3, 7-9 and 12-13 do not stand or fall together and arguments for the patentability of each group of claims, identified below, are set forth in this brief.

**Group I:** claims 1, 12 and 13, each of which stand or fall together.

**Group II:** claims 2, 7 and 8, each of which stand or fall together.

**Group III:** claim 3, which stands alone.

**Group IV:** claim 9, which stands alone.

## **VIII. ARGUMENTS**

### **Claims 1-3, 7-9 and 12-13 are Not Anticipated by Guelich**

#### *A. Discussion of Applied Art (i.e., Guelich)*

By way of background, Guelich discloses an apparatus for mixing, measuring and forwarding a multi-phase gas mixture (Guelich: col. 1, lines 7-13; and Fig. 1a). According to Guelich, a multi-phase gas mixture consists of at least two different phases, for example two fluid components which have a liquid as well as a gas or vapor component respectively (Guelich: col. 1, lines 14-19).

Guelich notes that a conventional apparatus for mixing and measuring a multi-phase fluid includes a measuring apparatus, placed after the drainage tube outside the container, with a

Venturi nozzle in order to measure the flow rate and with a densitometer in order to measure the mass/density of the fluid flow (Guelich: col. 1, lines 27-43). According to Guelich, the conventional apparatus has the disadvantage that the measuring apparatus is to be placed outside the container and that the measuring apparatus requires a densitometer, which generally operates with X-rays or gamma rays and is, thus, correspondingly complicated, expensive and trouble prone (Guelich: col. 1, lines 44-49).

In response, Guelich discloses an apparatus (and a method) for mixing and measuring a multi-phase gas mixture which enables the flow rate and the density of a fluid flow inside a container to be measured in a simple manner (Guelich: col. 1, lines 52-56).

The apparatus of Guelich comprises a removal apparatus with a drainage means in order to drain fluids out of a container (Guelich: col. 1, line 63 to col. 2, line 10). A pressure is maintained in the container by means of sensors, in particular a pressure of the gaseous fluid, a pressure in the removal apparatus or in the drainage means, as well as a level of the surface of the liquid forming in the container (*Id.*). Using these measured values and a calibration curve of the drainage means or of the removal apparatus, respectively, known in advance, it is possible to determine a flow rate for the gaseous component, a flow rate for the liquid component, as well as other characteristic values such as the relationship between the flow rates of the two components or the total flow rate as the sum of the two components (*Id.*).

FIG. 1a of Guelich shows a container 1 into which a supply tube 2 opens at an inlet opening 3 and supplies the container 1 with a multi-phase fluid flowing in the flow direction 20a (Guelich: col. 3, line 16 to col. 4, line 10). The liquid and gaseous fluid components are

separated in the container 1, with the liquid components collecting in the lower region of the container 1 in a liquid volume 14 and the gaseous components collecting in the upper part of the container 1 as a gas volume 10 (*Id.*).

A liquid surface 14a forms at the separating layer between the gas volume 10 and the liquid volume 14 whose actual height  $Z$  is measured by a sensor 13, with a reference height  $Z=0$  being defined so that an actual height  $Z_L$  can always be assigned to the liquid surface 14a (*Id.*). The fluids located in the container 1 are conducted back out of the container 1 or drawn off in a flowing manner in the direction of flow 20a via a removal device 6, 8 which comprises at least one drainage means 6 as well as a drainage means 8 following it (*Id.*).

The drainage means 6 is open at its upper end, with the opening forming an inlet opening 6a through which the greatest portion of the gaseous components from the gas volume 10 flow into the drainage means 6 (*Id.*). The drainage means 6 has a Venturi nozzle 9 in the region of its inlet opening 6a which is connected to a pressure sensor 12 via a connecting means 12a so that the flow rate of the gaseous component which flows through the inlet opening 6a into the drainage means 6 can be measured (*Id.*). A pressure sensor 11 as well as a temperature sensor 15 are arranged in the region of the gas volume 10 at the upper end of the container 1 in order to measure the temperature of the gaseous component as well as the pressure of the gaseous component (*Id.*).

From this, the pressure ( $\rho$ ) of the gaseous component can be calculated. The removal apparatus can also comprise a plurality of drainage means 6 which all open into the drainage means 8 or are led out of the container separately (*Id.*). With the help of a calibration curve that

was determined for the drainage properties of each drainage means 6 or for the entire removal apparatus 6, 8, respectively, the flow rates of the gaseous components as well as the flow rates of the liquid components can be calculated from the measured values (*Id.*).

*B. Claims 1, 12 and 13 (Group I) are not anticipated by Guelich*

Claim 1 is directed to a method of monitoring a proportion of a component in a gaseous mixture having at least two components and contained in an electrical switchgear enclosure. Thus, claim 1 requires an electrical switchgear enclosure. Indeed, particular issues arise in the context of an electrical switchgear that is insulated by a gas mixture. For example, as noted above, to maintain a breaking capacity that is satisfactory in such electrical switchgear, it is essential for a proportion of at least one component gas of the gas mixture to remain constant even in the event of leakage (see Appellants' specification: page 1, lines 20-28). Otherwise, differential losses between the two or more components of the gas mixture can give rise to loss of performance in terms of breaking capacity (*Id.*).

On page 2 of the Office Action dated November 18, 2003, the Examiner alleges that Guelich discloses a gaseous mixture, having at least two components, that is contained in an electrical switchgear enclosure (*citing* Guelich: Fig. 1 (sic), units 14 and 8). To the contrary, in no way does Guelich relate to electrical switchgear equipment, such as the gas-insulated high-voltage circuit breaker illustrated in Appellants' Fig. 1. Instead, Guelich describes a container (illustrated in Fig. 1a of Guelich) into which a multi-phase fluid flows and is separated in the container with the liquid components collecting as a liquid volume 14 and the gaseous components collecting as a gaseous volume 10 (Guelich: col. 3, lines 16-23). The fluids located

in the container 1 are conducted back out of the container 1 or drawn off in a flowing manner via a removal device 6, 8 that includes at least one drainage means 6 as well as a drainage means 8 following it (Guelich: col. 3, lines 32-36). Thus, contrary to the Examiner's allegation, neither fluid volume 10 nor the second drainage means 8 corresponds to the electrical switchgear enclosure, as recited in claim 1.

Furthermore, claim 1 recites, *inter alia*, "determining said proportion by processing the measured values in a data-processing unit". Thus, claim 1 requires determining a proportion of a component of the gaseous mixture by processing measured values of pressure, temperature and density of the gas mixture. By way of example, the method of claim 1 allows a determination of the proportion of N<sub>2</sub> in a gaseous mixture of N<sub>2</sub>/SF<sub>6</sub> or the proportion of CF<sub>4</sub> in a gaseous mixture of CF<sub>4</sub>/SF<sub>6</sub> (see Appellants' specification: page 1, lines 20-28).

On page 2 of the Office Action dated November 18, 2003, the Examiner alleges that Guelich discloses determining the recited proportion by processing the measured values in a data-processing unit (*citing* Guelich: col. 1, lines 20-25; col. 1, line 50 to col. 2, line 48; and col. 4, lines 11-64). To the contrary, Guelich describes that a pressure sensor 11 and a temperature sensor 15 are arranged in the region of the gas volume 10 at the upper end of the container 1 in order to measure the temperature of the gaseous component of the multi-phase fluid as well as the pressure of the gaseous component of the multi-phase fluid (Guelich: col. 1, lines 63 to col. 2, line 2; and Fig. 1a). Additionally, Guelich describes a Venturi nozzle 9, which is located in the region of an inlet opening 6a of the drainage means 6, for measuring (via pressure sensor 12) the flow rate of the gaseous component flowing therethrough (Guelich: col. 3, lines 52-63; and

Fig. 1a). In Guelich, a signal evaluation apparatus which receives the measured values calculates a total flow rate, a flow rate of the liquid components, as well as a flow rate of the gaseous components, from the measured values (Guelich: Abstract).

The flow rates calculated in Guelich do not correspond to determining the proportion of one gas to the other gases in a gaseous mixture. Therefore, Guelich fails to disclose or suggest “determining said proportion by processing the measured values in a data-processing unit”, as recited in claim 1.

Further still, the method of claim 1 allows the proportion of a component in a gaseous mixture contained in an electrical switchgear enclosure to be monitored in a non-intrusive manner. For example, the gas mixture does not have to be tapped, which is not compatible with the operating conditions of gas-insulated electrical switchgear, in order to be monitored (see Appellants' specification: page 2, lines 2-5). Instead of disclosing a gastight electrical switchgear enclosure wherein the gaseous components are introduced and remain for an insulating purpose, Guelich describes a container 1 wherein a multi-phase fluid is conducted to the container 1 via a supply tube 2 and wherein the liquid and gaseous components separated from the multi-phase fluid are led out of the container 1 via drainage means 6, 8 (Guelich: col. 3, lines 16-18; and col. 4, lines 38-42). Thus, given these fundamental differences between the container 1 of Guelich and the electrical switchgear enclosure (e.g., gastight enclosure 1 of Appellants' Fig. 1) of claim 1, Guelich fails to disclose and cannot possibly suggest enabling a proportion of a gaseous component of a gaseous mixture having at least two components to be monitored non-intrusively.

In view of the above, claim 1 is not anticipated by Guelich, under § 102(b). Claims 12 and 13 recite features similar to claim 1 and thus are not anticipated by Guelich, under § 102(b), based on a rationale analogous to that set forth above for claim 1.

*C. Claims 2, 7 and 8 (Group II) are not anticipated by Guelich*

Claims 2, 7 and 8 depend from claim 1, which is not anticipated by Guelich, under § 102(b), for at least the reasons set forth above in Section VIII(B). Thus, claims 2, 7 and 8 are not anticipated by Guelich, under § 102(b), at least by virtue of their dependency on claim 1.

Furthermore, claim 2 recites the patentably distinct features of "said proportion of a component in the mixture is calculated by the data-processing unit which is programmed to solve the thermodynamic state equations of said components". For example, since P, T and  $\rho$  are the variables measured by the sensors (*see* Appellants' claim 1), and with X as the mixture ratio to be determined, the Beattie and Bridgman equations for a two-component mixture give the following four relationships:

1.  $P(\text{SF}_6) = A1 * \rho(\text{SF}_6) + A2 * (\rho(\text{SF}_6))^2 + A3 * (\rho(\text{SF}_6))^3$  ;
2.  $P(\text{N}_2) = A4 * \rho(\text{N}_2)$  ;
3.  $P = X * P(\text{N}_2) + (1-X) * P(\text{SF}_6)$  ; and
4.  $\rho = \rho(\text{N}_2) + \rho(\text{SF}_6)$  ,

wherein A1, A2, A3 and A4 are well-known functions of temperature T;  $P(\text{SF}_6)$  and  $P(\text{N}_2)$  are the partial pressures of  $\text{SF}_6$  and  $\text{N}_2$ , respectively; and  $\rho(\text{SF}_6)$  and  $\rho(\text{N}_2)$  are the densities of  $\text{SF}_6$  and  $\text{N}_2$ , respectively (Appellants' specification: page 4, lines 4-24). By using these equations, the data-processing unit continuously outputs the mixture ratio X (*Id.*).

The Examiner alleges that Guelich discloses the features of claim 2 (*citing* Guelich: col. 1, line 63 to col. 2, line 9). Appellants disagree.

Guelich discloses that a pressure is measured in the container by means of sensors, in particular, a pressure of the gaseous fluid, a pressure in the removal apparatus or in the drainage means, as well as a level of the surface of the liquid forming in the container are measured (Guelich: col. 1, line 64 to col. 2, line 2). According to Guelich, with the help of these measured values and a calibration curve (which is known in advance) of the drainage means or of the removal apparatus, respectively, a signal evaluation apparatus can determine a flow rate for the gaseous component, a flow rate for the liquid component, as well as further characteristic values, such as the relationship between the flow rates of the two components or the total flow rate as the sum of the two components (Guelich: col. 2, lines 2-10).

Thus, contrary to the Examiner's allegations, Guelich fails to disclose or suggest that "said proportion of a component in the mixture is calculated by the data-processing unit which is programmed to solve the thermodynamic state equations of said components", as recited in claim 2. Instead, Guelich merely discloses measuring a pressure of a gaseous liquid and by using the measured pressure and predetermined calibration tables, determining a flow rate for the gaseous component.

Guelich does not teach any calculations for determining a proportion of a component of a gaseous mixture having at least two components (relative to the other components of the gaseous mixture). Instead, Guelich disparately relates to calculating a flow rate of the liquid components

and a flow rate of the gaseous components of a mixed and/or homogenized fluid (Guelich: col. 2, lines 11-17).

In view of the above, claim 2 is not anticipated by Guelich, under § 102(b).

Consequently, claims 7 and 8 are not anticipated by Guelich, under § 102(b), at least by virtue of their dependency on claim 2.

*D. Claim 3 (Group III) is not anticipated by Guelich*

Claim 3 depends from claim 1, which is not anticipated by Guelich, under § 102(b), for at least the reasons set forth above in Section VIII(B). Thus, claim 3 is not anticipated by Guelich, under §102(b), at least by virtue of its dependency on claim 1.

Furthermore, claim 3 recites the patentably distinct feature of “said proportion of a component in the mixture is determined by the data-processing unit which stores a data table in a memory, said data table containing a plurality of data items representative of various proportions of said component in correspondence with data items representative of various measurements of the pressure, of the temperature, and of the density of the gas mixture containing said component”. Thus, claim 3 requires a table that contains a plurality of items representing various proportions of a component of the gas mixture (*e.g.*, N<sub>2</sub>) corresponding to various measurement sets of the pressure, the temperature and the density of the gas mixture containing the component (*e.g.*, SF<sub>6</sub>N<sub>2</sub>) (Appellants’ specification: page 4, line 25 to page 5, line 2).

The Examiner alleges that Guelich discloses the recited data table (*citing* Guelich: col. 4, lines 11-65; and col. 10, lines 1-40). To the contrary, Guelich fails to disclose or suggest the use of any data table, let alone a data table that contains a plurality of items representing various

proportions of a component of a gas mixture corresponding to various measurement sets of the pressure, the temperature and the density of the gas mixture containing the component.

In view of the above, claim 3 is not anticipated by Guelich, under § 102(b).

*E. Claim 9 (Group IV) is not anticipated by Guelich*

Claim 9 depends from claim 1, which is not anticipated by Guelich, under § 102(b), for at least the reasons set forth above in Section VIII(B). Thus, claim 9 is not anticipated by Guelich, under §102(b), at least by virtue of its dependency on claim 1.

Furthermore, claim 9 recites the patentably distinct feature of an “electrical switchgear provided with an enclosure containing a mixture of at least two dielectric gases under pressure, wherein the proportions of the dielectric gases in the mixture are determined by implementing a method according to claim 1”.

The Examiner alleges that Guelich discloses these features of claim 9 (*citing* Guelich: col. 2, lines 11-48). To the contrary, Guelich merely describes a multi-phase fluid having both liquid and gaseous components (Guelich: col. 1, lines 14-19). Guelich fails to disclose or suggest a gaseous mixture of at least two dielectric gases, as recited in claim 9. Indeed, Guelich makes no mention of any dielectric gas.<sup>2</sup>

In view of the above, claim 9 is not anticipated by Guelich, under § 102(b).

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<sup>2</sup> Unlike Appellants' application, Guelich fails to disclose or suggest a gaseous component serving as an insulator.

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192  
U.S. Application No. 10/038,585  
Attorney Docket No. Q67992

**IX. CONCLUSION**

Appellants respectfully request the members of the Board to reverse the rejections of the appealed claims and to find each of the claims allowable as defining subject matter that is patentable over the art of record.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

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Billy Carter Raulerson  
Registration No. 52,156

Date: September 10, 2004

## APPENDIX

### CLAIMS 1-3, 7-9 and 12-13 ON APPEAL:

1. A method of monitoring a proportion of a component in a gaseous mixture having at least two components and contained in an electrical switchgear enclosure, said method comprising:

measuring the pressure, the temperature, and the density of the gas mixture using at least one sensor mounted on said enclosure, and

determining said proportion by processing the measured values in a data-processing unit, so as to enable the mixture to be monitored non-intrusively.

2/ A method according to claim 1, in which said proportion of a component in the mixture is calculated by the data-processing unit which is programmed to solve the thermodynamic state equations of said components.

3/ A method according to claim 1, in which said proportion of a component in the mixture is determined by the data-processing unit which stores a data table in a memory, said data table containing a plurality of data items representative of various proportions of said component in correspondence with data items representative of various measurements of the pressure, of the temperature, and of the density of the gas mixture containing said component.

7/ A method according to claim 2, in which the data-processing unit is a microcomputer.

8/ A method according to claim 2, in which the data-processing unit is formed by microprocessors or microcontrollers.

9/ Electrical switchgear provided with an enclosure containing a mixture of at least two dielectric gases under pressure, wherein the proportions of the dielectric gases in the mixture are determined by implementing a method according to claim 1.

12. A system for monitoring a proportion of a component in a gaseous mixture having at least two components and contained in an electrical switchgear enclosure, comprising:

at least one sensor mounted on said enclosure for measuring the pressure, the temperature, and the density of the gas mixture; and

a data processing unit for processing the measured values, so as to enable the mixture to be monitored non-intrusively.

13. A system for monitoring a proportion of a component in a gaseous mixture having at least two components and contained in an electrical switchgear enclosure, comprising:

first means mounted on said enclosure for measuring the pressure, the temperature, and the density of the gas mixture; and

second means for processing the measured values, so as to enable the mixture to be monitored non-intrusively.